The American Fertilizer

Vol. 99 AUGUST 14, 1943 No. 4

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See page 25

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"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 99 AUGUST 14, 1943 No. 4

The Fertilizer Distribution Program For 1943–44*

By WM. F. WATKINS

Chief, Requirements Section, Fertilizer Division, War Food Administration, Washington, D. C.

IT HAS been a year and a half since Pearl Harbor. That marked the beginning of a problem in the distribution of fertilizers in the United States as well as our entry into World War II. During the last year and a half the fertilizer industry and farmers have been greatly concerned with the problems of distributing fertilizers and of reaching crop production goals.

In this year and a half one of the major problems has been to distribute a short supply of nitrogen with an ever-increasing demand. This is true because in time of war the military requirements come first and they require a larger amount of nitrogen than any other claimant agency. Production cannot be increased overnight and it has been necessary for agriculture to get along with a supply somewhat less than actual need.

As the demand for food has increased, so has the demand for fertilizer, not only nitrogen but also phosphate and potash fertilizers. There is a limit to the production capacity of any type of material, and that is the position in which we find ourselves at the present time. These phases of the supply program have been covered in detail by Fdmund Rowland and Dale C. Kieffer, of the War Production Board.

The fact is that as we look forward into the next fertilizer year, 1943–44, the demand and maximum requirement for all fertilizer materials are in excess of the maximum supplies that can be made available. Some estimates indicate a supply 5 to 10 per cent less than the total amount farmers would like to buy. This does not mean that we are going to be short of supplies in terms of the quantities that we have been using in the past. We shall have more nitrogen and phosphorus than we have used in any previous year, and more potash than we have used in any year except during the last fertilizer year.

The use of increased quantities of fertilizer is one of the important methods we have of obtaining increased agricultural production. There are only so many acres of land. We are short of farm labor, and machinery can handle only so many acres. High yields per acre are necessary to obtain the maximum output of land, labor, and machinery. Greater production can be obtained in many instances by increasing the amount of fertilizer used per acre and by fertilizing a larger percentage of the acreage of a given crop. In addition, we have converted a considerable acreage of soil-building grasses and legumes to the growing of more soil-depleting grain and oilseed crops. Also, during the last two years, we have used up some of the soil fertility reserve that accumulated through nearly a decade of a soil conservation program. If crop yields are to be maintained and increased, we must apply increasing quantities of fertilizer to the land and use the supply where it will make the greatest contribution to a food program.

So much for the demand and supply of fertilizer for 1943–44. How can the supply of fertilizer available be distributed to obtain maximum agricultural production during the next year? Before going into a program for 1943–44, we should examine the developments of the last year and consider what adjustments or improvements can and should be made.

When you met here last year, T. E. Milliman discussed the Government-Fertilizer

* An address at the Annual Convention of the National Fertilizer Association, Hot Springs, Va., June 22, 1943.

Industry Hitch-up. He said, "The fertilizer industry has always been a hound for new business. It should be the same now and in the future, but the kind of new business should be different. The new business that a fertilizer company should look after during the next year is not the volume that comes from swiping another man's customer; rather the new business for 1943 should be secured by taking care of those farmers whose regular sources of supply are cut off . . . and to supply old customers with increased requirements of the proper ratio and grade to feed the crops this country calls upon them to produce for the war struggle."

At that time there was no Government order on fertilizer distribution. However, the several forms of chemical nitrogen were under Government allocation to the fertilizer industry. Only nitrate of soda had been under allocation for any length of time. Plans were under way to establish an official list of approved grades for the several States. Chemical nitrogen was definitely short. We thought there might be a large supply of oilseed meals available for use in fertilizer. There was a little concern about potash. In early July of 1942, Government recommended that chemical nitrogen be withheld from fertilizer used on fall-sown grains and made a request of the industry to that effect.

Fertilizer Distribution Orders

On September 12, 1942, the first fertilizer distribution order, M-231, was issued by the War Production Board. It contained an approved list of grades for 33 States and several restrictions on the use of fertilizers containing chemical nitrogen. In general, the grades contained less nitrogen than in 1941. There were many questions as to just how that order would work out, both in the manufacturing program and in supplying individual farmers. We in Government had the able assistance of Dr. Wm. H. Martin, of New Jersey, in developing the grade substitution plan. I do not need to go into detail as to how it applied to the manufacturer and the farmer, since you know as much or more about it than I. An Amendment to M-231 was issued on December 4, 1942, including the grade substitution plan. It had been carefully studied by the Fertilizer Industry Advisory Committee and recommended by them. They also recommended that an application for fertilizers be used in the distribution of fertilizers to farmers. Although it was not a requirement in M-231, as amended December 4, 1942, Government and industry generally agreed that such an application was necessary to carry out the provisions of the order.

Changes occur in Government as in the fertilizer industry. A new company was not formed to take the place of an old company, but on January 12, 1943, the administration of M-231 was transferred to the Food Production Administration of the Department of Agriculture. On January 18, 1943, Food Production Order No. 5 was issued by the U. S. Department of Agriculture, including M-231 practically in toto, with some additions. During the last five months we have had considerable experience with all of these additional features. One of the additions in FPO-5 was the use of the farmer application for fertilizer. Other additions pertained to a classification of crops, crop requirements, and eligibility of persons to obtain fertilizer.

The use of fertilizer is more important for some crops than for others; also, the production of some crops is of more importance in the war effort than others. The historic use of fertilizer cannot wholly be adhered to in the war effort in obtaining the correct use of fertilizer needed in a food program. Naturally, any classification is subject to some criticism and does not fit all sections of the country alike. And to have an effective classification, giving one group of crops priority over another, the group of crops with first priority must use only a small percentage of the total fertilizer. At least, a crop classification was deemed essential to obtain maximum production of the crops most vital in the food program. At the May meeting of the Fertilizer Industry Advisory Committee, members were asked if a crop classification should be continued in the 1943–44 program, and the response was unanimous that it should be continued.

Crop Classifications

With a short supply of fertilizer, the requirements should not exceed the demand too much, otherwise any program would be ineffective. Thus, the requirements for A crops were restricted only by State experiment station recommendations as to rate per acre. New users were permitted to obtain fertilizer and in some cases the rate of application per acre could be increased, resulting in fertilizers making a major contribution to increased production of these vital food crops.

There just was not a possibility that all growers of B crops desiring fertilizer could obtain all they wanted, so provisions were made to supply the old users, your old customers, and at the normal rate of application per acre. Thus, for A crops a horizontal

increase in the use of fertilizer was permitted on an increased acreage and a vertical increase in rate per acre up to the amount recommended by the State Agricultural Experiment Stations, while on B crops, the horizontal increase was kept to a minimum and no vertical increase in rate of application permitted.

Since January 18, fertilizers have been delivered on the basis of the farmers' crop requirements. You will note that I have not said ton for ton, or on an historic basis. In a majority of cases, that would not have worked. As a result of the war, the farmers' crop production program has changed with everything else. Farmers are not growing the same crops in 1943 that they grew in 1942 or 1941. The acreage of crops on a farm changes from year to year. This necessitates the supplying of fertilizer on the basis of the acreage of crops to be grown, and not on the basis of the crops grown last year or the year before.

I do not need to tell you the results of several of these features of FPO-5. They applied only to fertilizers containing chemical nitrogen. In some Western States, where the phosphate supply has been extremely short, fertilizer manufacturers and local dealers have been voluntarily applying these same principles in distributing phosphatic fertilizers.

In 1943–44 we are faced with some of the same distribution problems which we faced during the last year. We now have a potash allocation order, M-291. We have more liberal supplies of nitrogen, but a considerable amount in a different from than in the past.

During the last year the fertilizer industry has made a special effort to see that each fertilizer consumer received his fair share of the available supply in accordance with his crop requirements. You have not been selling fertilizers during the last year—you have been distributing them according to the crop requirements of our customers. These have not been normal times and we cannot expect normal times during the next year.

The fertilizer industry is faced with a more complex distribution program in the year ahead. Although some distribution procedures have been simplified, the types of nitrogen materials available will challenge both the technical skills and the salesmanship of the fertilizer industry.

Normally, there has been a distinct peak of fertilizer production and delivery in the spring. It will be different this coming year. You will be receiving supplies on a relatively uniform basis throughout the year, necessitating a year-round manufacturing program. Warehouse capacity is limited and some of the fertilizer for use in the spring of 1944 must be moved right out to the farm this fall, and lots more of it to the warehouse of the local dealer or agent.

Fortunately, we can all look forward to the program with more certainty than during the last year. The grades for the various States have been selected, the supply position is more positive, and, above all, we have the experience of the last year behind us.

The fertilizer grade program has been developed this year in the same manner as it was a year ago, with the agronomists of groups of States, working as committees of the American Society of Agronomy, making the original recommendations and these being reviewed and adjusted at regional fertilizer meetings with representatives of the industry and the agronomists. The primary objective has been to obtain a list of grades that will satisfy the crop and soil needs of each State, to provide a list that could be made with the materials which will be available, with a minimum quantity of filler, in order to conserve labor in your plants, to conserve the use of bagging material, and to reduce transportation requirements. In some areas it has been necessary to provide increased flexibility with multiple-strength grades being permitted, recognizing that possibly only a limited quantity of material would be available to manufacture these higher-analysis grades.

In developing the grade lists and fertilizer distribution program for 1943–44, we have gone on the assumption that we should be concerned with all of the three principal fertilizing materials, namely, nitrogen, phosphoric acid, and potash. Our experience with an approved list this last year has indicated a relatively small number of grades is very satisfactory. In a few cases there are, no doubt, a few more grades included in the State lists for 1943–44 than would be absolutely essential. However, considering the tonnage of fertilizer in some of these States and the wide variations in soils and in climatic conditions, we believe that the present lists are not excessive.

There is also some flexibility in the grade lists to permit manufacturers to utilize the materials which they will have available, particularly with respect to nitrogen and potash.

The list of approved grades is only the beginning of an equitable fertilizer distribution program. Experience with FPO-5 has indicated that two other features of the pro-

(Continued on page 24)

The Application of Nitrogen in Irrigation Water

By J. C. JOHNSTON

Extension Specialist in Citriculture, University of California, Berkeley, California.

THE application of chemical nitrogen in irrigation water is of special interest at this time because many growers will receive their fertilizer later than usual or it may be delivered in several installments. In many cases, this will necessitate changes in the method of using fertilizer if the greatest good is to be gotten from the materials available.

One of the problems is to get nitrogen into the root area of the soil when it is applied after the rainy season has closed. When soil is sprinkled or flooded, water penetrates downward more or less uniformly over all of the area wetted and fertilizer broadcast on the soil or dissolved in irrigation water penetrates satisfactorily, subject to limitations cited in later paragraphs.

When water is applied in furrows, part of the water penetrates downward and part moves sideways from the furrow and tends to carry soluble materials which are in or on the soil surface away from the furrow and toward the soil surface. On the other hand materials applied in the furrows before irrigation or dissolved in the irrigation water tend to move with the water into the root zone and give good distribution of the nitrogen. It is the purpose of this discussion to suggest methods of dissolving and applying nitrogen in irrigation water.

This method of applying soluble fertilizers and the mechanical devices used in the process are covered by a basic patent No. 1,868,913 owned by Eugene L. Prizer, J. Prizer, Donald C. Jones, and H. G. Nutt. These gentlemen have generously waived their rights for the duration of the war. Materials are not available to make new applicators and they feel that growers should have the privilege of using the method without restriction during the war period.

The common chemical nitrogen fertilizers available at this time are nitrate of soda, sulphate of ammonia, liquid ammonia, and ammonium nitrate. These materials behave differently when applied to the soil in irrigation water, but they all can be used successfully.

Nitrogen in the nitrate form penetrates soil readily and is carried into the soil as far as the water in which it is dissolved penetrates. Nitrate of soda is therefore a desirable form of nitrogen to use in irrigation water and is especially desirable where quick penetration is desired.

Nitrogen in the ammonia form becomes insoluble on contact with soil and remains fixed in the surface until it is transformed into the soluble nitrate form by soil organisms. When it is applied in irrigation water, it becomes fixed in the soil in the furrow and does not penetrate far below the surface. There is also a tendency for more nitrogen to be fixed in the upper end of the furrow than in the lower end. This tendency is greater in heavy clay soil than in light sandy soil, and it is greater when the stream carries soil particles than when the water runs clear. Because of this characteristic, furrows longer than 300 feet should be avoided whenever possible when any form of ammonia is used. In the interval between irrigations, the nitrogen which has been fixed by the soil is made soluble by the action of soil organisms and is carried into the root area by subsequent irrigations. For best results, it is necessary to use the same furrows one or more times after the fertilizer has been applied.

Ammonium sulphate and liquid ammonia give good results when applied in irrigation water. The slower penetration which results from the use of this form of nitrogen is often desirable, especially with shallow rooted crops and on open sandy soils where the fertilizer is apt to be carried below the root zone before it can be utilized by plants.

Liquid ammonia is a gas which has been reduced to the liquid form by pressure and is sold in steel cylinders. It dissolves very rapidly in water and is well suited to use in irrigation water. However, it is a gas and there is a certain amount of loss to the air during the time the solution is exposed in the irrigation furrows.

The rate of loss is determined by a number of factors and it is not possible to say how great it may be. The rate of loss increases as the air and water become warmer. The loss is greater in the sunshine than in the shade and is greater from a turbulent stream than from a

smooth flowing stream. It is increased by wind, and by the length of time it is exposed to the air before it gets into the soil. Even the amount and kind of minerals dissolved in the water influence the rate of loss. For best results, it should be applied in short runs and in smooth furrows. Weather cannot be selected but a cool, still day would be best and the loss at night would be less than in daytime.

Ammonium nitrate contains half of its nitrogen in the ammonia form and half in the nitrate form. Therefore, when this material is used in irrigation water, half of the nitrogen is carried into the soil by the water and half becomes fixed in the furrow to be changed to the nitrate form and later to be carried down by subsequent irrigations. This material would appear to have an advantage where both a quick and sustained effect are desired.

There are several simple and practical methods of dissolving chemical nitrogen in irrigation water. Where an open ditch or flume is available, a paddle wheel device can be constructed of noncritical materials which will feed the fertilizer directly into the irrigation stream. Such a device is described by C. S. Scofield in United States Department of Agriculture Circular 28, September, 1928.

The most simple method of dissolving fertilizers in irrigation water is to slit the bags and throw them into a weir box or other similar structure. By regulating the number of bags exposed to the irrigation stream and the size and number of slits in the bags, the rate of application can be controlled within certain limits. At best, this method will result in a considerable fluctuation in the amount of fertilizer carried by the water.

In some instances the irrigation layout is not suited to this method and, in many cases, more accurate control is to be desired. A more accurate method is to dissolve a definite amount of fertilizer in a tank of known capacity. The solution can then be trickled into the irrigation stream and by regulating the rate of flow any desired amount of fertilizer can be applied.

If the solution is drawn off through a valve in the bottom of the tank, the rate of flow will decrease as the tank empties but with a little attention from the irrigator a fairly uniform flow can be maintained. In certain cases, some means of maintaining a more uniform flow is necessary. One easy way to accomplish this is to provide a floating outlet illustrated in Fig. 1. It consists of a syphon which is held in place by a floating support placed in the tank. One end of the hose extends 2 or 3 inches below the surface of the solution and is protected by a suitable screen. The stream can be regulated by raising or lowering the outlet, or by a clamp which reduces the flow by pinching the hose. The hose should be only slightly larger than necessary to carry the desired stream. This method has the advantage of uniform flow and the outlet is away from any trash which may float on the surface or which may accumulate on the bottom of the tank.

Another method is to draw the solution off through a small tank in which a constant level

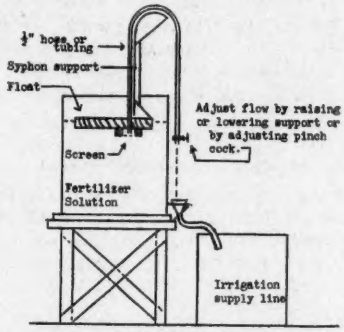

FIG. 1. Floating syphon with constant head outlet. For delivery to overflow stand, weir box or ditch. Float should be provided with guides.

is maintained by means of a horse trough float valve as shown in Fig. 2.

If the irrigation system is under pressure, the fertilizer solution can be pumped into the

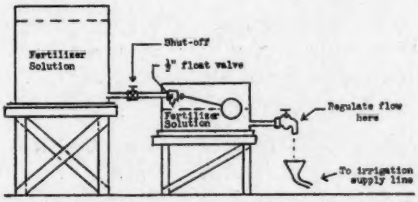

FIG. 2. Constant head maintained by float valve. For delivery to overflow stand, weir box or ditch.

line by a small centrifugal or gear pump operated by a ¼ h.p. motor. A good arrangement is to have a small tank supplied with water from the irrigation line and with a float valve to regulate the water level. The fertilizer solution is then run into this tank or preferably

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New Support Price for Cottonseed

In a move to stimulate greater production of cottonseed oil, meal, and linters needed for war purposes, the War Food Administration has announced that it is establishing a minimum support price for cottonseed produced from the 1943 crop at $55 per ton, f.o.b. shipping point in Oklahoma, Texas and New Mexico, and $56 per ton, f.o.b. shipping point in all other producing states. This is an increase of $6 per ton over last year's minimum support prices.

The new support price will be effectuated through an "open offer" by the Commodity Credit Corporation to support the market for cottonseed products. Operators of cottonseed crushing mills who accept the offer agree to pay for all cottonseed of the 1943 crop purchased in lots of 10 tons or more between August 1, 1943 and July 31, 1944, not less than the specified minimum support prices, f.o.b. shipping point, basis "U. S. Standard Grades," as amended July 18, 1939, subject to the rules, regulations, and standard methods covering the handling, sampling, and analysis of cottonseed for grading purposes established by the War Food Administration.

However, in any State or area where an oil mill which has accepted the offer desires to purchase cottonseed at a "flat" or "as is" price, such "flat" or "as is" prices shall average not less than the average price which would have been paid if each lot of cottonseed had been purchased on a "U. S. Standard Grades" basis.

For all oil mills meeting these conditions, Commodity Credit Corporation will support prices for cottonseed products through July 31, 1944, with an offer to purchase cottonseed oil at one-eighth cent per pound below the ceiling price; bulk cottonseed meal, 41 per cent minimum, at $43 per ton in Louisiana, Mississippi, Arkansas, Tennessee, Missouri, and Illinois; $44 per ton in North and South Carolina, Georgia, Alabama, and Florida, and $45 per ton in Texas, Oklahoma, New Mexico, Arizona, and California; and "chemical grade" linters at the ceiling price.

Under last year's program, the minimum support price for cottonseed was $49 per ton for basis grade seed f.o.b. shipping point in Oklahoma, Texas and New Mexico, and $50 per ton in all other producing states.

On the basis of the new support prices, taking into consideration average quality premiums and discounts and an average ginners' margin of not more than $3 per ton,

prices to growers should average approximately $53 per ton in bale lots at the gin.

Prices actually received by growers will, of course, vary from time to time and by areas according to the quality of seed being marketed, the prices being paid by mills, and the ginners' margin in effect at the time of marketing. Weather during the harvest period will affect the quality of the seed. Lower moisture in the seed will make each pound more valuable. Wet weather will increase the moisture content and decrease the value of each pound of seed.

Maine Fertilizer Conference

The conference held a Poland Spring, Maine, August 3rd and 4th was attended by more than 50 representative of the industry and agricultural workers. Dr. J. A. Chucka presided at the afternoon session and Ralph Fraser, district chairman, presided at the evening session. Prof. J. H. Waring, head of the Department of Horticulture, spoke on orchard fertilization; Dr. Gordon M. Cairns, head of the Department of Animal Husbandry, discussed the effect of quality of roughage in animal feeding, with discussion led by R. H. Lush; Prof. A. K. Gardner, State Executive Officer of AAA, spoke on "Crop Acreage Outlook for 1944"; and Dr. Chucka presented revised fertilizer recommendations for 1944. Also at the afternoon session George M. Worman, field service representative, WFA, discussed the changes in FPO 5 revised, answering a number of questions. P. W. Lowry of OPA outlined OPA's policy with respect to dollars-and-cents pricing, and Roland Payne of OPA presented suggested prices for Maine. At the evening session Charles J. Brand spoke on "War and Post War Agriculture," and "The Life of the Soil" was shown.

On Wednesday, August 4th, most of those in attendance went to Highmoor Farm to see the outstanding experiments on pasture fertilization which are being conducted there, also experiments on breeding potatoes, disease control, variety trials of vegetables, etc.

Despite the fact that the commercial potato acreage this season is approximately 200,000 acres, as compared to 144,000 acres grown in 1942, it was the consensus of those attending the conference that practically every grower was supplied with enough fertilizer to produce a good crop. There was some discussion of grades but no changes in the present list were recommended.

Fertilizer Conferences to Discuss Price Ceilings

At the request of OPA, the National Fertilizer Association has made arrangements for a series of sectional meetings at which the fertilizer industry could discuss with government officials the proposed dollars-and-cents maximum prices for fertilizers for the coming season. The meetings will be attended by OPA and WFA representatives, and as far as possible by officials of the War Production Board. The schedule as arranged at present is as follows:

August 20.	Baltimore, Md., Lord Baltimore Hotel
August 26.	Boston, Mass., Parker House
August 27.	New York City, Pennsylvania Hotel
Sept. 1.	Raleigh, N. C., Sir Walter Raleigh Hotel
Sept. 2.	Columbia, S. C., Columbia Hotel
Sept. 3.	Atlanta, Ga., The Atlanta Biltmore
Sept. 4.	Jacksonville, Fla., George Washington Hotel
Sept. 6.	Montgomery, Ala., Jefferson Davis Hotel
Sept. 7.	Jackson, Miss., Robert E. Lee Hotel
Sept. 8.	Shreveport, La., Washington-Youree Hotel
Sept. 10.	Los Angeles, Cal.
Sept. 13.	San Francisco, Cal.
Sept. 14.	Seattle, Wash.
Sept. 16.	Louisville, Ky.

The hotels for the last four meetings will be announced later. All meetings will start at 10:00 A. M.

Basis for Tankage and Blood Prices Established

In Amendment No. 1 to revised MFR 74, the Office of Price Administration has ruled that all sales of dry and wet rendered tankage and dried blood are to be made on the exact percentage of protein or ammonia content. This ruling applies to both domestic and imported products.

The amendment also provides for the computation of the maximum price of digester tankage, blood meal and blood flour on a basis of the guaranteed percentage of ammonia in the raw materials used to make these products. The amendment became effective on August 9th.

Fertilizer Executives Join WPB Staff

Raymond R. Hull, Vice-President in charge of production of I. P. Thomas & Son Co., Camden, N. J., and formerly in the explosives division of du Pont, is now deputy chief of the Nitrogen Unit of WPB.

Paul J. Prosser, vice-president, The Baugh & Sons Co., Baltimore, has joined the staff of the Agricultural Chemicals Unit of WPB as a consultant and will assist on production problems of superphosphate and sulphuric acid for the superphosphate industry.

Lime Distribution Program for Northeast Region

Authorization of immediate distribution of lime to farmers in the Northeast region under the 1944 farm production program was announced on July 30th by the War Food Administration.

Under this program farmers will be furnished lime, in lieu of Agriculture Adjustment Agency payments, to increase wartime production.

The early start on distribution will make it possible for the lime manufacturers to continue full-scale operations in the normally dull part of their production year. Indications are that this procedure will increase the total quantity of lime available in this region by approximately one-third over that of any previous year.

A total of 1,100,000 tons of lime on a farm-yard-delivery basis is authorized for distribution under the AAA program in eight states of the region, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey. This is more than twice as much lime as was furnished under the program in these states in 1943.

August Cotton Report

The August 1st cotton report issued by the Crop Reporting Board on August 9th indicates a total production of 12,558,000 bales and an all-time record average yield of 279.4 pounds per acre—7 pounds above the previous record of 272.5 pounds produced in 1942. Weather conditions thus far have been fairly good for growth and development of the crop, and infestation of weevils in all States is below that for 1942, when loss from weevils was about average. The crop is generally earlier than usual, being from one to two weeks earlier in most areas. The area in cultivation July 1st, yields per acre, and production are shown in the following table:

State	Production (Ginnings)* 500 lb. gross wt. bales		
	Average 1932–41 Thous. bales	1942 Crop Thous. bales	1943 Crop Indicated Aug. 1 Thous. bales
Missouri	333	417	335
Virginia	29	34	28
North Carolina	606	727	695
South Carolina	760	699	740
Georgia	997	862	855
Florida	25	16	17
Tennessee	479	625	575
Alabama	1,014	925	920
Mississippi	1,530	1,968	1,980
Arkansas	1,298	1,485	1,300
Louisiana	618	593	710
Oklahoma	691	708	500
Texas	3,419	3,038	3,275
New Mexico	104	111	125
Arizona	170	193	143
California	384	402	340
All other	18	21	20
United States	12,474	12,824	12,558

*Allowances made for interstate movement of seed cotton for ginning.

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FERTILIZER MATERIALS MARKET

NEW YORK

Deliveries Against Allocation Being Made for Chemical Nitrogen and Potash. Increased Superphosphate Production Urged But Lack of Sulphuric Acid May Prove Obstacle. Licenses for Imports of Feed Organics Granted.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, August 10, 1943.

Sulphate of Ammonia

It is reported that complete deliveries have been made against allocations but no additional releases have been reported.

Nitrate of Soda

This material has been delivered as allocated but no additional releases have been reported and as yet it is not known what quantities will be imported for the new season.

Potash

Deliveries against allocations are being made regularly and it is expected that possibly the domestic output of potash may be increased during the present year. There is some agitation for granting priorities to potash manufacturers for certain necessary machinery for the increase of their production.

Superphosphate

The government is requesting a tremendous increase in the production of superphosphate but it is very doubtful that the government estimate can be reached for the new season although it is expected that there will be a considerable increase in the production of superphosphate over last year. The supply of phosphate rock can be obtained for the increased production of superphosphate but it is a question as to whether sufficient sulphuric acid will be available at necessary locations. It is possible that certain plants in rather remote areas which are now dormant, may be put into operation to supply additional sulphuric acid, but unless plants for the manufacture of superphosphate are erected near this supply, it will mean long rail hauls in tank cars to get the acid to the necessary plants where the supply of superphosphate can be increased. There have been no new allocations of triple superphosphate for domestic manufacturers so that unless there are some additional allocations, practically the entire production of the United States of this material will be shipped against Lend-Lease.

Organics

Some licenses have been granted for the importation of meat scrap and tankage from South America but the licenses cover comparatively small quantities which will be used for feeding materials and it is not expected that any of this material will find its way into the fertilizer industry.

BALTIMORE

Increased Production Being Studied. More Nitrate of Soda Expected. Lack of Sulphuric Acid Hinders Superphosphate Production.

Exclusive Correspondence to "The American Fertilizer"

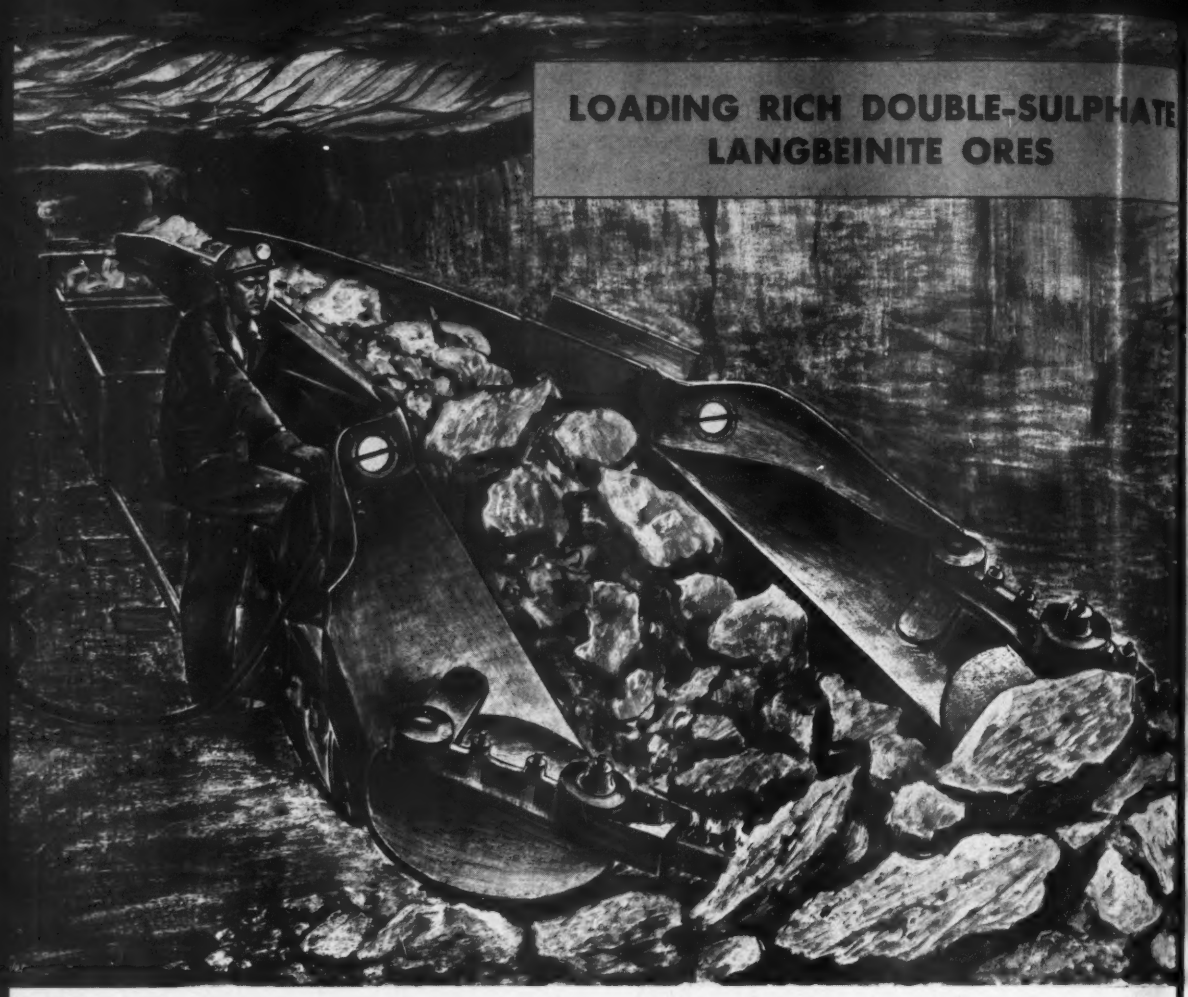
BALTIMORE, August 10, 1943.

Fertilizer manufacturers are now figuring ways and means to produce the utmost tonnage of plant food for next season's business, consistent, of course, with raw materials available and restrictions of Government agencies.

Ammoniates.—There is a very heavy demand for all grades of ammoniates for feeding purposes. In fact, the demand is so far in excess of the supply that there are practically no organic ammoniates to be had for fertilizer purposes.

Sulphate of Ammonia.—There are indications of easing up in the shortage of liquid ammonia, but of course at the expense of a proportionate quantity of sulphate of ammonia, which latter is much more desirable in fertilizer mixtures for obvious reasons. Prices on such sulphate as is obtainable on yearly contracts through allocation remain practically unchanged.

Nitrate of Soda.—It is anticipated that the tonnage of this product for use in mixtures



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will again be above normal and applied as an offset against shortage of ammonia in the form of sulphate which is being used largely for defense purposes. The production of ammonium nitrate, which is now available to American fertilizer manufacturers for shipment from Canada is also bound to alleviate shortage which might otherwise ensue.

Fish Meal.—There are only a limited number of vessels fishing this season, and there has recently been an improvement in the catch, but the entire output will doubtless go for feeding purposes, as there is a very heavy demand, and the ceiling price is practically prohibitive for fertilizer purposes.

Superphosphate.—There is no change in the situation, but no stocks are accumulating, due to scarcity of sulphuric acid. The ceiling price of 64 cents per unit of A. P. A. is still effective, although it would be difficult for any manufacturer to place new orders on this basis, due to the scarcity of this product.

Potash.—There is nothing new in the situation and deliveries are now being made on contracts previously booked. Fertilizer manufacturers are accumulating stocks in order to have the goods on hand when needed next spring.

Bone Meal.—The market is dormant and practically no demand or offerings of either raw or steamed bone meal, the market on both of which is nominally $50.00 per ton, f.o.b. Baltimore.

Bags.—Nothing new since last report, and it is understood from recent rumors that shipments of burlap from India will be arriving in better volume, which might result in easing up in restrictions and permit the use of burlap for the shipment of fertilizer and other prohibitive products which formerly used burlap bags.

CHARLESTON

Further Allocations of Nitrogenous Awaited. Sulphuric Acid Scarce. New Ceiling Prices on Cottonseed Meal.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, August 9, 1943.

Nitrogenous.—There have been no further allocations of nitrogenous material, and the question has become a serious one with the fertilizer manufacturers.

Sulphate of Ammonia.—This market firm, with the price the same as previously, although the production is running slightly less than it was this time last year.

Dried Blood.—No change in this market. The price is still $5.53 per unit of ammonia ($6.72 per unit N), f.o.b. Chicago. Practically all of this material is going to feed.

Sulphuric Acid.—The superphosphate producers are anxious to increase their production, but are experiencing difficulty in securing sufficient supplies of sulphuric acid.

Cottonseed Meal.—The Government has just authorized new maximum prices on cottonseed meal, 8 per cent ammonia, $46.50 per ton, Georgia; $47.00 in South Carolina, and $47.50 in North Carolina, plus cost of bags at the mills.

Soybean Meal.—Price in bulk is $45.00, Decatur, Ind.

PHILADELPHIA

Market Quiet. Little Organic Ammoniates Available for Fertilizers. Low Supplies of Sulphuric Acid Reported.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, August 9, 1943.

With vacations and the usual summer letdown, business has been quieter here, and the past couple of weeks have not brought any particularly unusual news.

Ammoniates.—As mentioned many times

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before, almost all organic ammoniates go to the feed trade, and there are not sufficient supplies available to satisfy that one demand. Only the very low grades turn up once in a while for the fertilizer mixers.

Sulphate of Ammonia.—The full allotment is being given to mixers under the allocation plan.

Nitrate of Soda.—Shipment are moving on schedule, and otherwise there is nothing new to report.

Superphosphate.—Low supplies of sulphuric acid are apparently holding production down somewhat. Of course, the higher grades are scarce, for the reasons mentioned heretofore.

Bone Meals.—Demand still exceeds available supply.

Potash.—Now that most contracts are booked, the activity has settled down to making the shipments.

CHICAGO

Offering of Nitrogenous Tankage Quickly Taken. More Supplies Wanted. Imported Tankage Alloted to Feeding Trade.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, August 9, 1943.

Some nitrogenous tankage was placed on the market recently at ceiling prices, and was booked apparently without hesitation on buyers' part. More is wanted, but probably no additional tonnage will be offered on the market until some future time. Expressions have been heard that the increased use of ammonium nitrate will have its effect on the demand for organics, but judging from the present demand, that seems unlikely.

Some South American tankage has been received and it is hoped that more will be available later. It will be placed by allotment to the feed trade. Meanwhile, feed demaud is unabated.

Ceiling prices are well maintained throughout the list. High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.38 ($6.54 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Drouth Hurts Crop Prospects. Government Figures Show Notable Increase in Production of Tennessee Phosphate Rock.

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, TENN., August 9, 1943.

A break in the terrific drouth in Middle Tennessee came with some heavy rains at the end of July. As can be imagined the rain was too late to permit much crop to be made for 1943, so that 50 per cent is still a rather full estimate for crop in this part of Tennessee.

Great activity continues in the phosphate fields as all consuming channels now want shipments and at this season the farmer demand for direct application would take every car that could be shipped, if it could be directed to them.

Final figures of the Department of the Interior, released August 3rd, show that Tennessee shipped or consumed 1,254,801 short tons in 1941 and 1,530,295 tons in 1942, an increase of 25 per cent. If the rate of increase for 1943 continues the same as for the first half of the year, 1943 will record approximately two million tons, or three times the figure of 1930, which up to that time was the all-time record here.

An idea of the growth of the use of ground rock by farmers for direct application is given by the fact that while the actual shipment into that consuming channel for first half of 1943

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has exceeded that for 1942 same period by over 50 per cent, the unfilled orders on the books of the several producers, running into 1944, 1945 and 1946, aggregate over two and one half times the present installed capacity of the field for grinding, bagging and loading. The bottle-neck at present is personnel for bagging and loading.

It is also of interest to note that, in the same period of time, production and use of superphosphate has increased from 3,900,000 tons, to 5,145,000 tons and seems likely to run over five and a half million in 1943.

In addition to their truck dump and track near Thompson Station for handling run-of-mines matrix, Federal Chemical Co. has installed another track and truck dump, nearer to West Harpeth. The rock is shipped in crude form in steel hopper cars to the plant at Mt. Pleasant, an average of 1,000 to 1,500 tons per day being handled.

Connecticut Station to Hold "Open House" in September

The Connecticut Agricultural Experiment Station will hold an "Open House" on the Station grounds, Huntington Street, New Haven, on Wednesday, September 8th. Departing from its traditional Field Day at the Mount Carmel farm, the Station is this year setting aside a half-day for the public to visit the Station proper with its four laboratory buildings and six acres of ground.

Open House will begin at 1:30 P. M. with a brief welcome by Director William L. Slate and a talk on "Plants and People" by Montague Free, horticulturist of the Brooklyn Botanic Garden. Following the program, visitors will have an opportunity to see the Station laboratories and greenhouses at work. Staff members will be on hand to explain the work in progress and answer questions people may have on farm and garden subjects.

To help satisfy the tremendous interest in home vegetable gardening, the Station will provide a "Victory Garden Clinic" as a feature of its Open House. To the clinic amateurs are invited to bring problems on soil, diseases and insect pests and any other phases of vegetable or flower gardening. The field work of the staff will be illustrated by moving pictures of forestry and mosquito control, and by kodachrome slides of the Mount Carmel experimental grounds and the Tobacco Substation at Windsor.

Fertilizer Placement for Vegetables

The results of a five-year experiment in the placement of fertilizers for vegetable crops are given in a recent bulletin (No. 443) issued by The Pennsylvania Agricultural Experiment Station, State College, Pa. The methods tested included starter solutions, band placement, plowed down, and broadcast. The conclusions reached and the recommendations for Pennsylvania vegetable growers are as follows:

1. Starter solutions are of definite value for increasing yields of tomatoes, cabbage, sweet corn, and snap beans—especially early yields. It is probable that other vegetable crops not studied up to this time would also be benefited by starter solutions. A good all-round starter solution can be made from 8 pounds of 4–16–4 fertilizer to 50 gallons of water for transplanted crops, of which a cupful is applied to each transplant; and 4 pounds of 4–16–4 to 50 gallons for seeded crops applied at the rate of one quart of the solution to 10 feet of seeded row. Other commercial fertilizers could be substituted, such as 4–12–4, 5–10–5, 3–12–6, etc. When a commercial fertilizer is used it should be mixed with water (not necessarily in the ratio in which it is to be used) at least an hour before using, stirred from time to time, and finally diluted to the required volume.

2. Band placement of the entire fertilizer application, either dry or in solution, up to 500 pounds of 4–16–4 or other suitable complete fertilizer is of definite advantage for increasing

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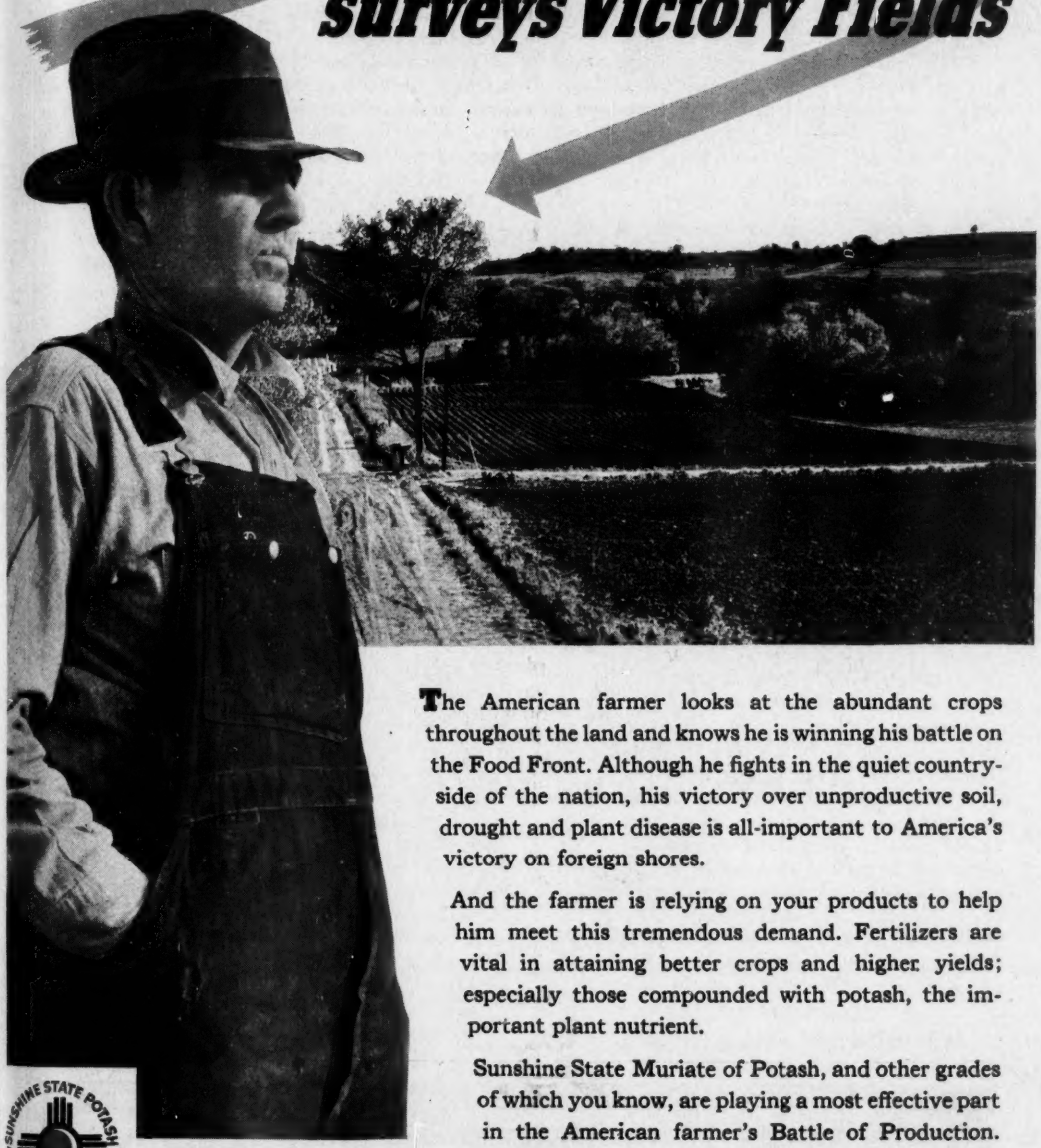
Food Front General surveys Victory Fields



The American farmer looks at the abundant crops throughout the land and knows he is winning his battle on the Food Front. Although he fights in the quiet countryside of the nation, his victory over unproductive soil, drought and plant disease is all-important to America's victory on foreign shores.

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early yields of sweet corn. Plowing down the fertilizer application in bands is a better practice from the standpoint of increasing total yields of sweet corn. A combination of the two methods, such as plowing down the bulk of the fertilizer and then using a starter solution such as already has been described or applying about 100 pounds of 4–16–4 in bands would probably be still better from the standpoint of both early and total yields.

3. The recommendation just given, that of a combination of plowing down in bands and starter solution or band placement, should hold for other seeded crops such as lima beans, snap beans, and peas. Band placement of 500 pounds of 4–16–4 or more per acre for snap beans and lima beans is too much, especially in a dry season. A better practice would be either that already recommended or broadcasting the nitrogen and potassium carriers and placing part or all of the phosphorus carrier in bands.

4. Band placement of fertilizers had no significant advantage over broadcasting for tomatoes, cabbage, and spinach in the experiments reported. The same conclusion would probably hold for similar crops not used in these tests, such as cauliflower, broccoli, eggplant, kale, swiss chard, etc.

5. Broken band placement for transplanted crops was not significantly better than continuous band placement.

6. Plowing down fertilizers in bands, a single band in each furrow, holds much promise. Tomatoes, sweet corn, peas, and carrots responded very well to this method as far as total yields were concerned. The early yield of sweet corn was definitely not improved by this treatment. As suggested above, the use of a starter solution, or band placement of a part of the fertilizer application, in addition to plowing down the bulk of the fertilizer in bands would probably be better if early yield is a consideration. More experimentation is necessary before general recommendations for plowing down fertilizers are made, but the method holds much promise especially in dry seasons. Plowing down fertilizer in bands is preferable to broadcasting the fertilizer before it is plowed down.

7. The application of fertilizer materials in solution to soils of a type such as Hagerstown silty clay loam for the production of vegetables is of questionable value according to the experiments reported herein. The method is cumbersome, it did not appear to be especially effective on any of the crops on which it was tried except for the production of early sweet corn. With regard to this exception, it appears that if a market gardener wishes to obtain an extra early yield of sweet corn, the application of the fertilizer in solution, using fertilizer materials that are relatively soluble, such as nitrate of soda, muriate of potash, and Ammo-phos, to the sweet corn in the seeded row would be profitable. The application of fertilizer in solution to tomatoes and peas did not prove profitable in comparison with other methods of application.

Marvin Jones' Statement on AAA Activities

On July 30th, Marvin Jones, Administrator of War Food Administration, announced that new instructions concerning the limitations placed by Congress on the activities of AAA employees have been issued.

"The present instructions have caused some confusion in the field," said Mr. Jones. "However, after looking into the matter I am sure that all Congress wished to do was to prevent promotional activities and did not intend in any way to interfere with the state, county and community committeemen giving full information to individual farmers and groups of farmers, or to anyone else as to the operations of the program. These new instructions will make this clear and not in any way prohibit the necessary activities of these employees in discharging their official duties. We are making the regulation as brief and simple as possible."

The new regulation is as follows:

Informational agents cannot be employed in regional, state, and county offices and no employee shall engage in any promotional or propaganda activities or in any activity designed to influence legislation. State, county, and community committeemen may give full information to individual farmers and groups of farmers, or to anyone else as to the provisions of and the operations of the farm program.

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THE APPLICATION OF NITROGEN IN IRRIGATION WATER

(Continued from page 9)

the pipe leading from it and pumped into the irrigation line. The latter arrangement keeps fertilizer away from the float valve and avoids corrosion. This arrangement is shown in Fig. 3. In all cases the fertilizer should be introduced into the irrigation line well ahead of the first outlet so as to make sure thorough mixing takes place.

The distribution of fertilizers in solution can be no better than the distribution of the irrigation water in which it is dissolved and great care must be used to see that all parts of the field receive equal amounts of water if waste is to be avoided. Where sprinklers are used or where water is applied in basins, this is not difficult, but with furrow irrigation, there is a tendency to allow excessive penetration at the

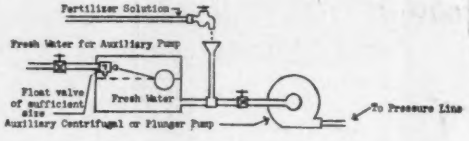

FIG. 3. Suitable arrangement when irrigation water is under pressure. Pump must overcome pressure in irrigation line.

upper end of the run or to allow run-off at the lower end of the run. Penetration can be equalized by using short runs and by hurrying the water through to the end of the furrow and then regulating the stream to avoid run-off. Some growers hold the fertilizers off until the water is through to the end of the furrows, or they apply the fertilizer only during the latter part of the run. When nitrate nitrogen is used on open, sandy soil it may be desirable to apply the fertilizer only in the last part of the run to avoid excessive penetration, but this is only desirable where loss by deep penetration occurs and on soils where a reduction in percolation rate would not be objectionable. In general, the fertilizer should be put in all of the water so as to keep the concentration as low as possible.

Some fertilizers when dissolved in irrigation water tend to decrease the rate of water penetration on some soils. This effect is minimized by keeping the solution as dilute as possible; in other words, by distributing it through all of the water. In some instances the rate of water absorption by the furrows may be greatly reduced. In such cases, it is helpful to break the crust in the furrows by suitable tillage.

Fertilizers used in irrigation water have been known to cause failure of concrete pipe lines. This effect has been studied by Professor A. F. Pillsbury of the University of California at Los Angeles. He reports as follows:

Ammonium sulphate has the most harmful effects on concrete. The corrosive effect appears to be in proportion to the concentration of the solutions, and the period of exposure. Ammonium sulphate can be used without undue hazard in irrigation water if the following rules are observed: (a) a proportioning device must be used to prevent solutions from ever being more concentrated than about 0.2 per cent; (b) concrete pipe lines must be flushed with "clean" water after each application; and (c) as is customary, the total net time the solutions are in contact with pipe lines may not exceed about one week per year. Nitrate of soda, liquid ammonia, and ammonium nitrate in concentrations comparable to those used when fertilizer is applied in irrigation water had no more effect on the pipe than distilled water.

If the fertilizer is to be dissolved in a tank, it will assist in determining the size of the

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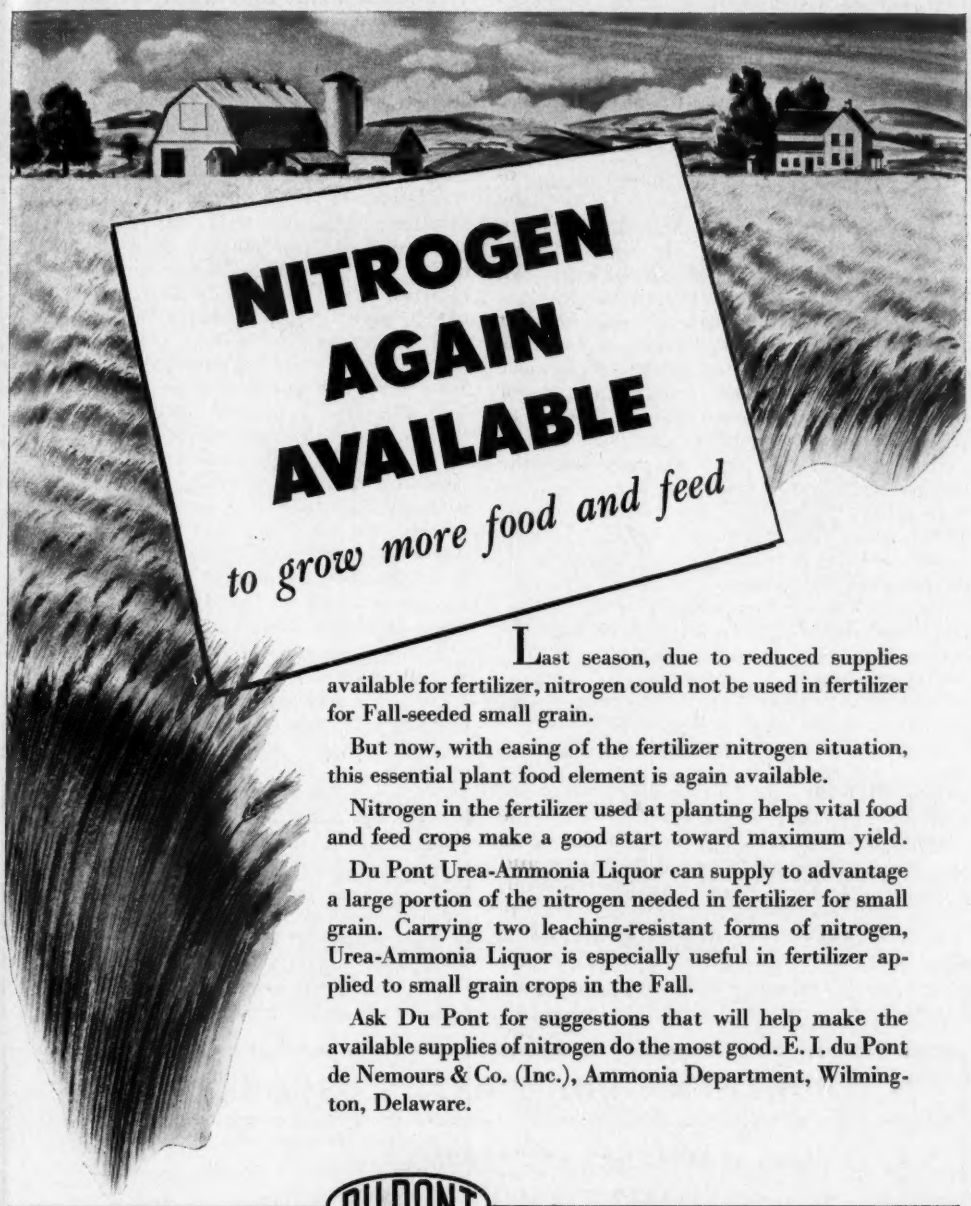

NITROGEN AGAIN AVAILABLE

to grow more food and feed

Last season, due to reduced supplies available for fertilizer, nitrogen could not be used in fertilizer for Fall-seeded small grain.

But now, with easing of the fertilizer nitrogen situation, this essential plant food element is again available.

Nitrogen in the fertilizer used at planting helps vital food and feed crops make a good start toward maximum yield.

Du Pont Urea-Ammonia Liquor can supply to advantage a large portion of the nitrogen needed in fertilizer for small grain. Carrying two leaching-resistant forms of nitrogen, Urea-Ammonia Liquor is especially useful in fertilizer applied to small grain crops in the Fall.

Ask Du Pont for suggestions that will help make the available supplies of nitrogen do the most good. E. I. du Pont de Nemours & Co. (Inc.), Ammonia Department, Wilmington, Delaware.

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URAMON
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FERTILIZER COMPOUND

UREA-AMMONIA
LIQUOR

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

tank needed if the solubility of the materials to be used is known. In round numbers the amount which will dissolve in 100 gallons of water at ordinary temperatures is as follows:

Nitrate of soda	700 lb. per 100 gal. of water
Ammonium sulphate	600 lb. per 100 gal. of water
Ammonium nitrate	1,400 lb. per 100 gal. of water

It is not easy to get the maximum amount of fertilizer indicated into solution, so a lesser amount should be used, say 500 lb. of fertilizer to 100 gallons of water. It will be more accurate if the fertilizer is dissolved before the tank is filled to the desired capacity.

A common method used to dissolve fertilizers for this purpose is to suspend the material in the tank in burlap bags. Whatever method is used, be sure the fertilizer is all dissolved and the solution is thoroughly stirred before application begins.

An example will serve to show how the method works. If it takes 24 hours to irrigate a 10-acre field, and the owner wants to apply 100 lb. of fertilizer per acre, 1,000 lb. of fertilizer will be required. If the fertilizer is dissolved in 200 gallons of water, it will take 8⅓ gallons of solution per hour to supply the right amount of nitrogen if it is used in the entire run. At this rate the stream will fill a gallon measure in 7 minutes and 12 seconds. If this is too slow for the apparatus, the amount of water used to dissolve the fertilizer can be increased. If 400 gallons are used to dissolve the fertilizer, it will be necessary to adjust the stream to fill a gallon measure in 3 minutes and 36 seconds.

When soluble nitrogen fertilizer is to be applied during the irrigation season, it is economical and practical to dissolve it in the irrigation water wherever the irrigation layout is such that the distribution of water can be controlled. If the water cannot be distributed evenly, the method will be wasteful and some other system of distribution should be used.

THE FERTILIZER DISTRIBUTION PROGRAM

(Continued from page 7)

gram have been very desirable: (1) use of the application forms and (2) crop classification and crop requirements. The distribution of fertilizers according to crop requirements necessitates that some form of application be used in order that the distributor may assist the farmer in supplying the proper grades of fertilizer and materials according to the acreage of crops which he is planning to grow and at a reasonable—not at an excessive—rate per acre. The crop classification, as included in FPO-5, provided a list of the most vital crops to receive first priority for fertilizer use. In order that a classification of this kind would amount to anything, it is essential that the total consumption of fertilizers in Group A crops should not exceed 25 per cent of the total supply. The crops included in Group A are the principal vegetable crops, potatoes, the oilseed crops, and some crops grown for seed production. The list for this year is changed only slightly from that of last year. All cotton has been placed in Group B, and sugar beet seed and some other minor crops have been added to the Group A list.

The requirements for Group A crops are the same as in last year's program, the producer of any Group A crop being eligible to make application for fertilizer and at a rate per acre not in excess of the recommendation of the State agricultural experiment station. The requirements for Group B crops have been opened up slightly to permit some new growers who do not have a fertilizer history to become eligible to buy fertilizer. However, in last year's program this restriction applied only to those who had absolutely no history of use on any B crop. But in the heavy fertilizing-consuming areas most individual farmers previously had used fertilizer on B crops and were, therefore, eligible to make

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. . . . WHEN BORON IS NEEDED TO CORRECT A DEFICIENCY OF THIS IMPORTANT SECONDARY ELEMENT

Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION

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Pioneer Producers of Muriate of Potash in America

See Page 4

application and to obtain fertilizers if the supply was available. The rates of application on B crops are continued at the usual rates of plant food per acre, or the customary rates in the area, but not in excess of the recommendations of the State agricultural experiment stations.

I would like to point out that, since the distribution in 1943–44 will apply to the N, P, and K in fertilizers, the rate of application per acre, by definition in the order, will apply to the total plant food applied per acre, and not to the number of pounds per acre of a given grade. Therefore, if the rate on a B crop containing 16 units of plant food per 100 pounds of fertilizer is 500 pounds per acre, making a total of 80 units of plant food, and a 20 unit plant food fertilizer is purchased in the next year, the rate of application will be expected to be reduced to 400 pounds per acre.

These, of course, are problems which will have to be thoroughly discussed with the local fertilizer distributors and the farmers so that they will make applications for the proper amounts and kinds of fertilizer.

There are some other features of the fertilizer distribution program which are minor in nature in comparison with our total agricultural fertilizer usage, but are of extreme importance to a few individuals and to our whole civilian economy. Provisions have been made for a victory garden fertilizer, the same as during the past year, except that there are grades for three different areas: 6–10–4 for the Pacific Coast States, 4–12–4 for the Midwest States, and 5–10–5 for the Atlantic Coast and the Southern States. The packaging regulations are the same, that is, 5-, 10-, 25-, 50-, and 100-pound packages are provided as were available this year. We recognize that immense quantities of victory garden fertilizer have been distributed during the past year, and believe that with these grades more satisfactory fertilizer for gardens will be available throughout the country during the next year. Also, victory gardeners may purchase small quantities of nitrate of soda, ammonium sulphate, or ammonium nitrate to supplement the mixed fertilizer, if needed.

During the last year we have had several problems in connection with specialty fertilizers. This is an important problem as it affects a large number of people. In order to meet this problem, provision has been made that not more than 50 per cent of the nitrogen and potash used in specialty fertilizers in 1941–42 may be used in fertilizers during the next year. Each fertilizer manufacturer will be permitted to manufacture one grade of specialty fertilizer. This may be one of the approved grades or an unapproved grade. Such fertilizer must contain a minimum of 16 units of plant food and not more than 25 per cent of water-insoluble nitrogen. The distribution of this specialty fertilizer will be unrestricted as to its users and as to the areas in which it is distributed. The restriction as to distribution of pressed tablets and hydroponics is removed from the order and quantities to be made will be determined on the basis of the availability of the materials with which to manufacture such products. There is also a limitation on the quantity of fertilizer that can be delivered for use on cut flowers, bulbs, nurseries, and other non-food uses; that is, they are limited to 75 per cent of the quantity used in either of the last two years for such production.

Before closing, I think I should say a few words regarding the use of organic nitrogenous materials in fertilizer. It was determined that the best way for Government to handle organic nitrogenous materials was to limit the amount that could be used in the manufacture of mixed fertilizers and to limit the amount that would be available for direct sale for use in home-mixing. This has been established at 70 per cent of the quantity used in 1941–42. Provisions of the order require that all materials, such as processed tankage, sewage sludge, castor pomace, oilseed meals unfit for feed, and other organic materials, except animal and poultry manures, peat, and humus, shall be used according to the provisions of the order in mixed fertilizer or for other uses. Provisions were made for individual processors of organic nitrogenous materials to distribute a quantity of their production as specialty fertilizers and it is expected that approval will be given for this distribution on about the same basis as is permitted in FPO-5.

In conclusion, the fertilizer distribution program for 1943–44 provides for the distribution of the fertilizer through the normal distributing channels and for fertilizer being made available under simple Government rules and regulations in order to obtain the maximum production of the most needed food crops. Every pound of nitrogen, phosphoric acid, and potash that can be obtained will be distributed in order to assure the maximum quantities of these needed foods. The distribution program places little emphasis upon the historic use of fertilizer and major emphasis upon the distribution in accordance with the crop requirements.

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BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Textile Bag Mfrs. Association, Chicago, Ill.

BAGS—Paper
Bagpak, Inc., New York City
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Union Bag & Paper Corporation, New York City.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

BAG CLOSING MACHINES
Bagpak Inc., New York City.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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BUYERS' GUIDE

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BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City

CONTACT ACID PLANTS
Chemical Construction Corp., New York City

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Company, New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Company, Columbus, Ohio.
International Minerals and Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Coronet Phosphate Co., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia–Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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Sackett & Sons Co., The A. J., Baltimore, Md.
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Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
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SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

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Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
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Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
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SULPHUR
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Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M. Charleston, S. C.

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Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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SUPERPHOSPHATE—Concentrated
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International Minerals & Chemical Corporation, Chicago, Ill
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SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
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Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
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Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
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Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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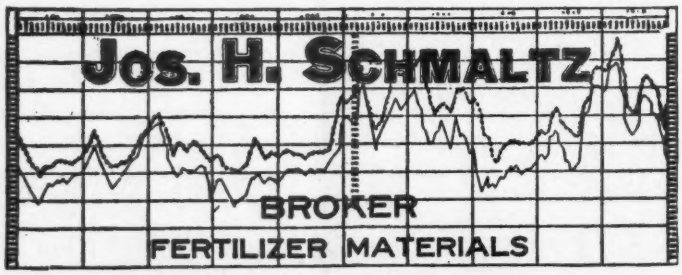

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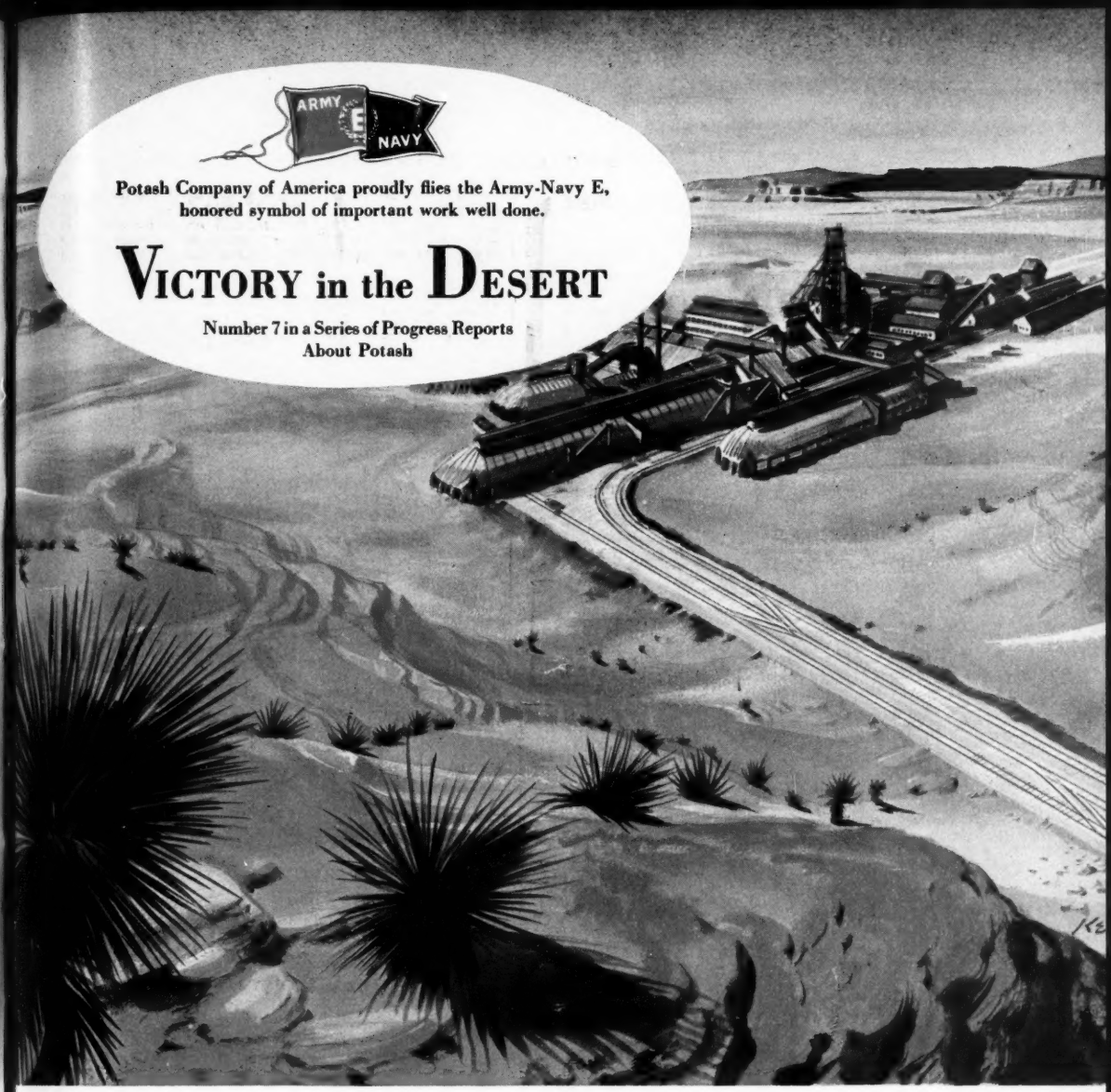

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